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Mobility and Transport
Air Accident Investigation Unit

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Safety Investigation Report

ACCIDENT SCHEMPP-HIRTH JANUS C AT WEELDE AIRFIELD ON 21 APRIL 2014

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FOREWORD

This report is a technical document that reflects the views of the investigation team on the circumstances that led to the accident.

In accordance with Annex 13 of the Convention on International Civil Aviation and EU Regulation 996/2010, it is not the purpose of aircraft accident investigation to apportion blame or liability. The sole objective of the investigation and the Final Report is the determination of the causes, and to define recommendations in order to prevent future accidents and incidents.

In particular, Article 17-3 of the EU regulation EU 996/2010 stipulates that the safety recommendations made in this report do not constitute any suspicion of guilt or responsibility in the accident.

The investigation was conducted by the AAIU(Be)

The report was compiled by Sam Laureys and was published under the authority of the Chief Investigator L. Blendeman.

Note:

About the time zone: For the purpose of this report, times will be indicated in UTC, unless otherwise specified.

SYMBOLS AND ABBREVIATIONS

’	Minute
°C	Degrees centigrade
AAIU(Be)	Air Accident Investigation Unit (Belgium)
AGL	Above Ground Level
ARC	Abnormal Runway Contact
	Airworthiness Review Certificate
ATO	Approved Training Organisation
BCAA	Belgian Civil Aviation Authority
CG	Centre of Gravity
EASA	European Aviation Safety Agency
EBAW	Airport of Antwerp
EBWE	Weelde airfield
EU	European Union
FAA	Federal Aviation Administration (USA)
FH	Flight hour(s)
ft	Foot (Feet)
GmbH	Gesellschaft mit beschränkter Haftung (German Limited Liability Company)
GPS	Global Positioning System
IGC	International Gliding Committee
KAC	Kempische Aeroclub
LBA	Luftfahrt-Bundesamt’ (German Civil Aviation Authority)
LVZC	Liga van Vlaamse Zweefvliegclubs
kt	Knot(s)
lbs	Pounds
LH	Left hand
m	Metre(s)
METAR	Meteorological Terminal Aerodrome Report
MTOW	Maximum Take-off Weight
N	North
PIC	Pilot in Command
QNH	Pressure setting to indicate elevation above mean sea level
RH	Right hand
RWY	Runway
UTC	Universal Time Coordinated

TERMINOLOGY USED IN THIS REPORT

Safety factor: an event or condition that increases safety risk. In other words, it is something that, if it occurred in the future, would increase the likelihood of an occurrence, and/or the severity of the adverse consequences associated with an occurrence.

Contributing safety factor: a safety factor that, had it not occurred or existed at the time of an occurrence, then either:
(a) the occurrence would probably not have occurred; or
(b) the adverse consequences associated with the occurrence would probably not have occurred or have been as serious, or
(c) another contributing safety factor would probably not have occurred or existed.

Other safety factor: a safety factor identified during an occurrence investigation which did not meet the definition of contributing safety factor but was still considered to be important to communicate in an investigation report in the interests of improved transport safety.

Safety issue: a safety factor that
(a) can reasonably be regarded as having the potential to adversely affect the safety of future operations, and
(b) is a characteristic of an organisation or a system, rather than a characteristic of a specific individual, or characteristic of an operational environment at a specific point in time.

Safety action: the steps taken or proposed to be taken by a person, organisation or agency on its own initiative in response to a safety issue.

Safety recommendation: A proposal of the accident investigation authority in response to a safety issue and based on information derived from the investigation, made with the intention of preventing accidents or incidents. When AAIU(Be) issues a safety recommendation to a person, organization, agency or Regulatory Authority, the person, organization, agency or Regulatory Authority concerned must provide a written response within 90 days. That response must indicate whether the recommendation is accepted, or must state any reasons for not accepting part or all of the recommendation, and must detail any proposed safety action to bring the recommendation into effect.

Safety message: An awareness which brings to attention the existence of a safety factor and the lessons learned. AAIU(Be) can disseminate a safety message to a community (of pilots, instructors, examiners, ATC officers), an organization or an industry sector for it to consider a safety factor and take action where it believes it appropriate. There is no requirement for a formal response to a safety message, although AAIU(Be) will publish any response it receives.

AAIU-2014-6

SYNOPSIS

Date and time:	Monday 21 April 2014 at 12:01 UTC
Aircraft:	Schempp-Hirth Janus C, two-seat sailplane, serial number 205
Accident location:	Airfield of Weelde - EBWE – N 51° 23’ 31.6’’ E 4° 57’ 2.3’’
Aircraft owner:	Vlaamse Zweefvlieg Academie vzw (VZA) - Weelde
Type of flight:	General Aviation - Local
Phase of flight:	Landing
Persons on board:	2
Injuries:	2

Abstract:

The purpose was to make a local gliding flight with a passenger ending with practising an approach on the airfield using the tail brake parachute. According to the pilot, the parachute deployment was activated right after the turn into final but the parachute actually deployed when the sailplane was still at a height of 50m. The sailplane violently hit the ground in a nose-down attitude.

Occurrence type:

Abnormal runway contact (ARC)

Cause(s):

A late deployment of a brake parachute at low altitude during landing, hindering the pilot in his execution of a proper flare, with a nose-down impact to the ground as a consequence.

Contributing safety factor(s):

- Airmanship: no lessons learned from previous event, no thorough preflight briefing between the crew
- Procedures: lack of guidelines on how to handle in case of a malfunction of the tail brake chute system

1 Factual information.

1.1 History of flight.

It was Easter Monday, a public holiday, and there were a lot of people and activity on the airfield. The purpose of this flight was to glide locally and to exercise an approach on the airfield using the tail brake parachute. The pilot in command (PIC) of the flight and the passenger were two members of the Vlaamse Zweefvlieg Academie (VZA) and both licensed glider pilots with experience on the Janus C sailplane. According to the aero club, every member flying the Janus C sailplane practices this procedure once or twice a year.
At the beginning of the day, the tail brake parachute was folded and put into the box on the lower end of the rudder by the PIC himself. The passenger took place in the rear seat, the PIC sat in the front seat. The sailplane was launched by a tow-plane.
The flight was uneventful up to the approach. When the sailplane was in final for a landing at the grass strip right of runway 07 at a height of approx. 90m above ground level (AGL), the flaps were lowered to the second position (position 'L') and the air brakes were raised. The speed was stabilized to an indicated airspeed of 105km/h (verified with groundspeed of IGC-file[1]). According to the PIC, it was at that time that he activated the tail brake chute. However, the parachute did not immediately deploy. The PIC continued the approach up to an approximate height of approx. 50m AGL, when the parachute eventually did deploy. The PIC, having his left hand on the air brake handle and his right hand on the stick, pushed the stick to keep the airspeed. A few seconds later the sailplane violently impacted the ground and almost immediately came to a halt approximately 325m in front of the perpendicular taxiway.
Both pilot and passenger had to be removed from the glider by the rescue services using spine supporting stretchers. The rear instrument panel and control column were cut out because the control column was jammed against the passenger's stomach, and the glider fuselage was cut to facilitate further movement. Extracting the pilot was a reasonable straight forward operation, although he suffered major injuries (multiple vertrebal fractures). The passengers had only minor injuries.

[1] An IGC-file is an ASCII text format file containing flight data from flight recorders approved for competitions. IGC stands for International Gliding Commission. In this case both pressure altitude and GNSS positions w ere recorded every 8 seconds.

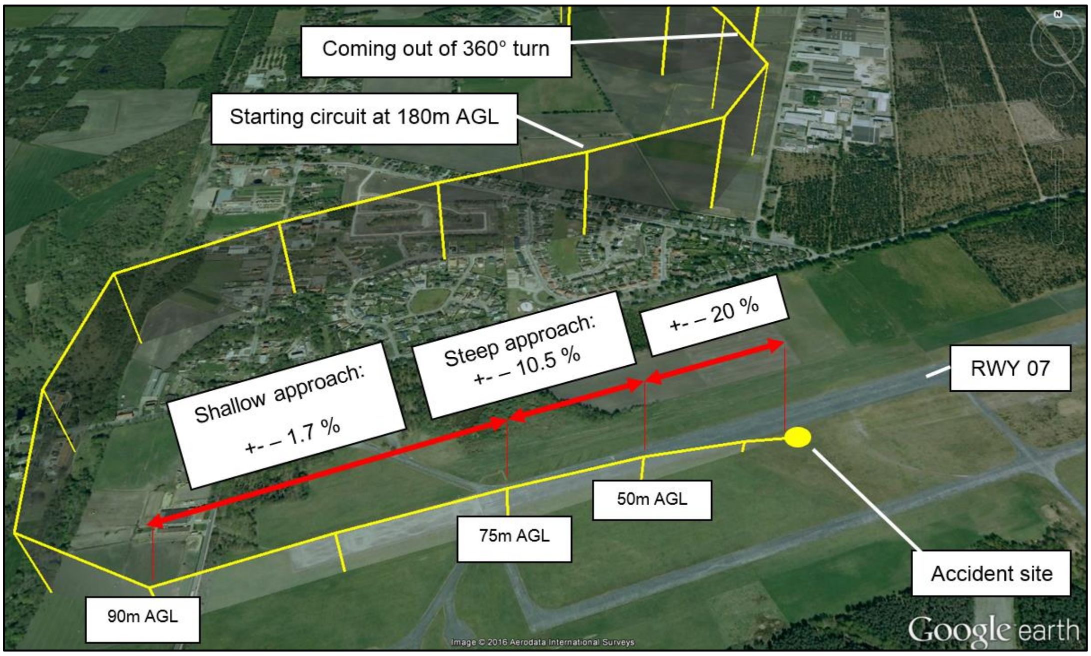

Figure 1: last part of the flight, retrieved from the IGC-file

Two weeks before, the same PIC made a solo flight also ending with a parachute landing where the parachute deployed at low height, although according to him it had already been activated at a height of 150m AGL. A ground check afterwards didn't reveal any anomaly of the system.

Statement of the pilot

"During the approach everything was normal until I activated the parachute at a height of +-150m. I felt that the parachute didn't deploy and can recall that at a height of +- 50m my passenger asked if the parachute was already out. I answered that it wasn't the case and focused on a landing without parachute. Couple of seconds later, at a height of +-40m, I felt that the parachute yet deployed, with a decrease in airspeed as result. Jettisoning the chute wasn't an option for me because in that case I should have to take the stick with my left hand and with my right hand remove the lock plate, jetisson the parachute and than switch hands again for the flare. So only 2 options left; push or pull the stick. By pulling the stick the airspeed would even decrease more which could lead to a stall. So I pushed the stick forward. However, it was too late to round out properly with a crash landing on the nosegear as a consequence."

Statement of the passenger

"Before beginning the circuit, the PIC took one last turn (probably to gain height in a feeble thermal) to the north of the airfield. I found that the turn was unnecessary, and unlikely to gain us some height. At this point I felt uncomfortable that we were starting the circuit lower than I would like for a parachute landing. We turned into final and I saw the landing flaps being selected and a proportion of airbrakes opened- normal for a normal approach. I had not noticed the speed as with experience it is normal to watch just the attitude of a glider on approach in preference to monitoring the airspeed.

As we got deeper into the field I was sufficiently uncomfortable about our height, that I asked the PIC if the parachute was out. He answered 'not yet', which I took to mean that he had not yet operated the parachute deployment mechanism.
At this moment the thoughts of a previous landing the same PIC had made, went through my mind. As with this flight he was making a parachute landing. I was one of those watching when the Janus was brought unusually deep into the field, and the parachute opened just above and before passing the point where we all stood. We wondered what had happened that the parachute should open so late. The PIC's answer was that the parachute 'did not open on time'.
My next reaction was to look if I could eject the parachute. I was wearing a rain-jacket and the pockets covered the side of the seat, including the parachute deployment handle. I moved my jacket out of the way, and realised that the lock plates that we use to prevent unwanted release of the parachute were still in place.
I was starting to look up and forwards again when the next thing that I sensed was a sudden manoeuvre as the PIC pushed the stick fully forwards. The rest happened so quickly that the only recollection that I have is that we were pointing towards the ground, and I shouted 'No', when I realised we were out of control."

1.2 Injuries to persons.

Injuries	Pilot	Passenger	Others	Total
Fatal	0	0	0	0
Serious	1	0	0	1
Minor	0	1	0	1
None	0	0	0	0
Total	1	1	0	2

1.3 Damage to aircraft.

The aircraft was substantially damaged.

Figure 2: The damaged Janus after the accident.

1.4 Other damage.

None

1.5 Personnel information.

Pilot

Sex:	Male
Age:	56
Nationality:	Belgian
Licence:	Sailplane pilot licence, first issued on 26 July 2001 by the Royal Belgian Aero Club, valid until 07 April 2015.
Ratings:	Winch and aerotow-start. Authorization to carry passengers
Medical:	Medical certificate, EU-MED class 2 last issued on 18 February 2014, valid until 28 March 2015

At the time of the accident the pilot had a total flight experience of 1141 FH – all with sailplanes - from which 210 FH in 5 years with the Janus C. The month preceding the accident he accumulated 7 flights of which 4 were on on the accident sailplane. Two weeks before the accident, he had already performed a landing with a late deployment of the tail brake parachute. That landing was without incident.

The pilot is, within the club, amongst the few who fly with the Janus C. He has adequate experience in folding the parachute and in re-installing the assembly in the box.

Passenger

The passenger, aged 66, was also a licensed sailplane pilot with experience on the Janus C.

1.6 Aircraft information.

General

The Schempp-Hirth Janus is a high performance two-seat sailplane with a glass-fibre monocoque fuselage built by Schempp-Hirth GmbH. The forward swept wings are equipped with upper surface airbrakes and camber-changing flaps which are operated between +12° (down) and -7° (up). The wings also have integral compartment water tanks installed with a capacity of 120 litres each.

The sailplane was type-approved in 1975 by the German Aviation Authority – 'Luftfahrt-Bundesamt' (LBA) on the basis of the airworthiness requirements for sailplanes - 'Lufttüchtigkeitsforderungen für Segelflugzeuge' (LFS) with the type certificate data sheet no. 295. It automatically became EASA (European Aviation Safety Agency) approved in accordance with Commission Regulation (EC) No 1702/2003. New sailplanes designed and certified in the European Union now have to be in compliance with Certification Specifications CS-22.

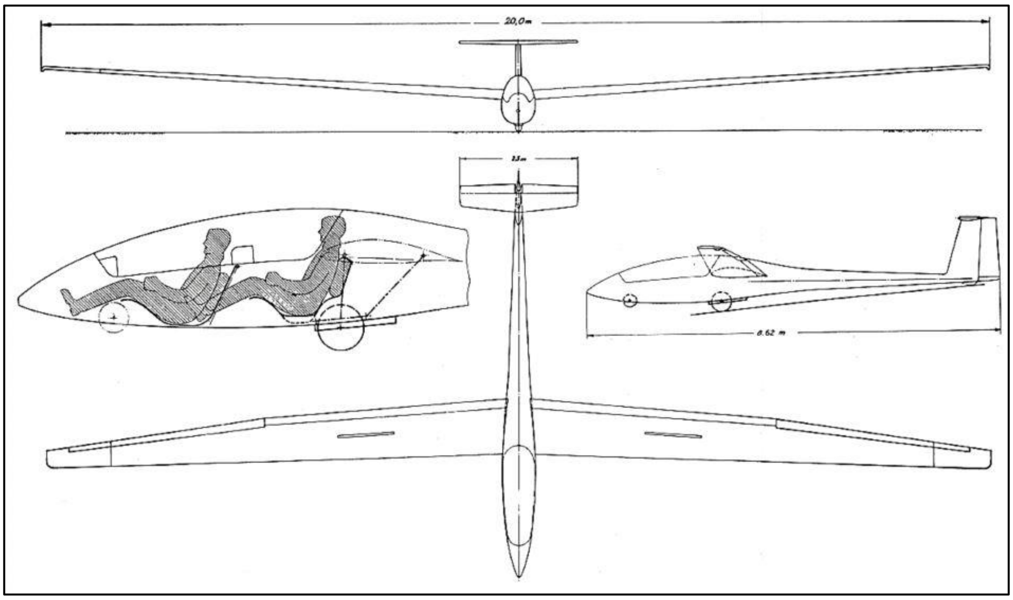

Figure 3: Janus C

Over the years, several variants were made. The Janus C variant has weight-saving carbon-fibre wings with an extended span width and a carbon-fibre tailplane. The Janus C could also be fitted with a tail brake parachute, just like the older Nimbus-2. More than 300 Januses were built when production stopped in 1996.

Characteristics

• Water ballast:	2 x 120l
• Length:	8.62m
• Wingspan:	20m
• Height:	1.45m
• Wing area:	17.4m²
• Aspect ratio:	23
• Empty weight:	365kg
• MTOW:	700kg

Performance

• Stall speed:	73km/h
• Never exceed speed:	250km/h

- Manoeuvring speed: 180km/h
- Max. glide ratio: 43.5 at 110km/h
- Rate of sink: 0.6 m/s at 90km/h
- Max wing loading: 40kg/m²
- Stall speed with full extended airbrakes: 81km/h

The sailplane concerned was a Janus C built in 1985, bearing serial number 205. It is fitted with the optional tail brake parachute. The landing gear consists of a retractable main wheel and a nose-wheel. The airplane holds a valid EASA Certificate of Airworthiness, issued on 21 March 2008, and the last Airworthiness Review Certificate was issued on 17 March 2014, expiring on 1 April 2015 (approval reference: BE.MG.0113) by the Liga van Vlaamse Zweefvliegclubs vzw (LVZC), which is the coordinating body of all Flemish glider clubs.

Tail brake parachute

A tail brake parachute, also called drogue chute, is a device used to add extra drag during the approach as a supplement to the airbrakes. It has no direct effect on lift. Because the drag increases, the glide ratio L/D is reduced resulting in a steeper dive angle and making steep approaches (for short field and/or off-field landings) possible. Deploying the parachute will reduce the airspeed but has almost no effect on the pitch angle. To compensate for the reduced airspeed the pilot has to push the stick forwards. Because nowadays the air brakes are more effective than in the past, tail brake parachutes aren't commonly installed on modern sailplane designs.

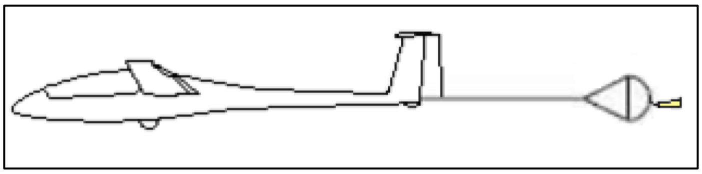

Figure 4: Sketch of a released fin-parachute assembly

The tail brake chute installed on the Janus C is a BS 1300 of Walter Kostelezky GmbH & Co. KG, which is a round parachute with diameter 1.3m.
Already in 1980, Schempp-Hirth issued Technical Note No. 295-6 allows the brake parachute to be omitted. As it was not required to comply with the airworthiness requirements, it could be removed by the owner.
The chords of the parachute are attached to the fuselage structure by a torsion spring-loaded hook and the canopy of the parachute is fixed to its cover box by means of a ring. The cover box is attached to the underside of the rudder by 2 conical pins and a tension spring-loaded lock pin.

The parachute is activated by fully duplicated controls consisting of a handle at the right-hand side of each seat. In order to operate the system, the pilot has to hold the stick with his left hand and to take the handle with his right.

The handle is moved forwards and slided into a notch ('open' position) to release the box-parachute assembly. The drag force on the cover box pulls the parachute out and assists with the proper deployment.

When moving the control handle further and fully forward, the box-parachute assembly can be jettisoned. The spring-loaded hook will be opened, causing the parachute's chords end to be released from the sailplane. The handle will spring back when releasing it, there's no notch to keep it in the jettison position.

In order to prevent unwanted release of the brake chute during flight, the aero club made 'lock plates'. To slide the handle to the 'open' position, a lock plate has to be manually removed first. For jettisoning the chute, a second lock plate has to be removed. This is a practice that is well known and applied within the glider community but however not based on an approved design.

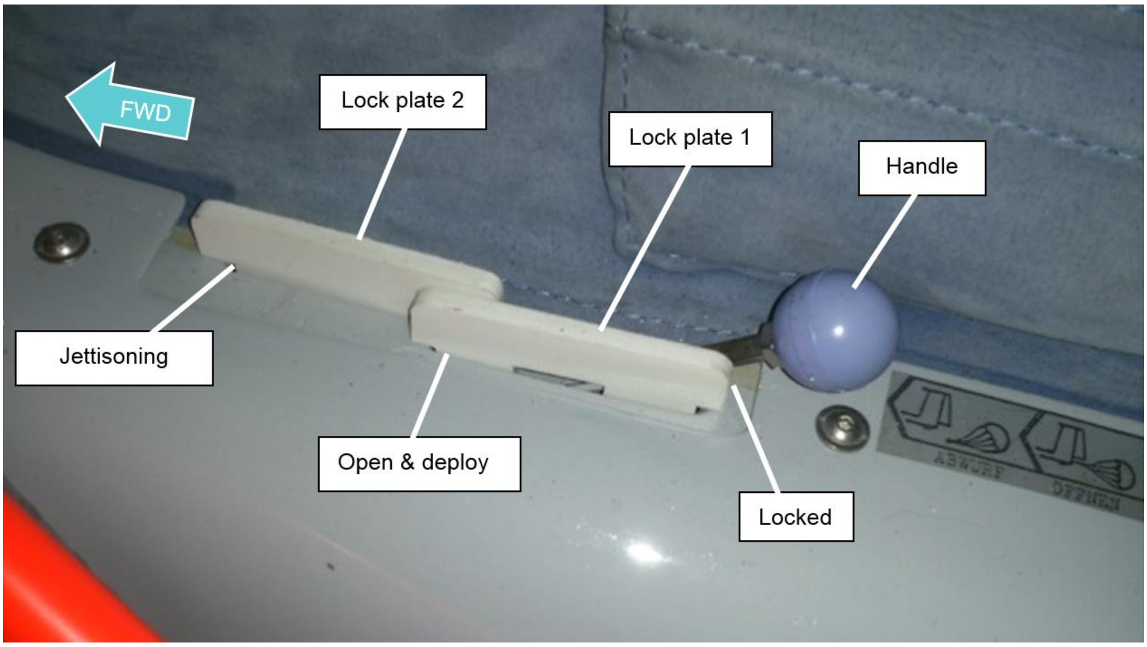

Figure 5: The forward seat guide slot with operation handle of the brake chute

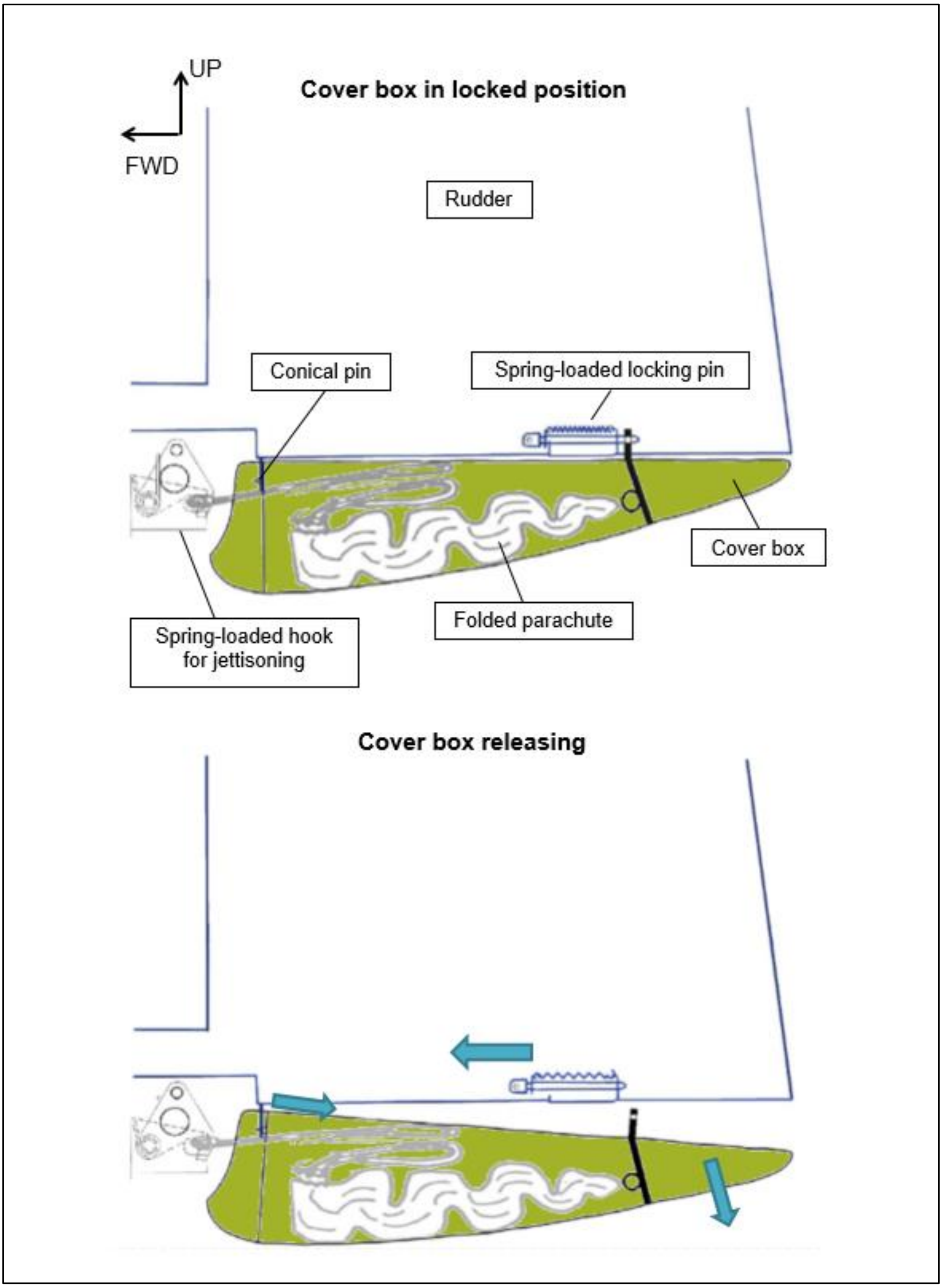

Figure 6 : A sketch of the brake chute releasing mechanism (not on scale)

Flight manual

The original flight manual of the aircraft is written in German. In chapter 4 ‘Normal operation’ of the flight manual is under paragraph 4.2 (10) described how to operate the brake parachute.

Translated extract:

(10) Operation of the parachute

The operating handle with a blue knob through a guide slot is installed at the right-hand side of the cockpit where the seat is attached to the fuselage.

Handle in the rear position:
brake parachute locked.

Pushing the handle to the middle section of the slot:
opening of the brake parachute.

Further advancement of the lever to the front stop of the slot:
Jettisoning the brake parachute.

Make sure that the handle is not inadvertently pushed over the middle section of the guide slot when the brake parachute should only be opened.

The service and maintenance instructions for the brake parachute are added to the flight manual. This includes a sketch on how to fold up the parachute in a S-shape manner in the cover box.

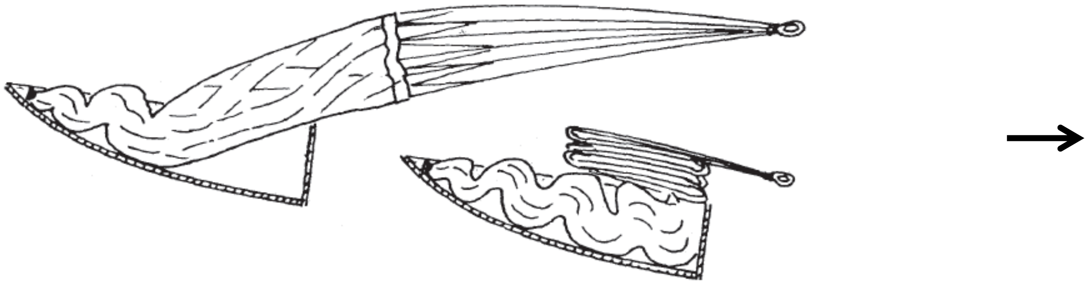

Figure 7: Sketch from the flight manual on how to fold up the parachute in the cover box

1.7 Meteorological conditions.

The nearest airfield with a METAR available was the airport of Antwerp (EBAW), which gave the following information:

Wind: 6 kt, mainly coming from 40° variable between 340 and 90°
Visibility: more than 10km
Clouds: few at 4500ft
Temperature and dew point: 19°C/07°C
QNH: 1003 hPa

The windsock on the airfield of Weelde gave a wind direction of 70° at the time of the accident, meaning full headwind for the aircraft landing on the parallel grass strip.

1.8 Aids to navigation.

Not applicable.

1.9 Communication.

The pilot was in contact with 'Weelde Radio'. There was communication between the pilot and the passenger during the flight and there is neither report nor evidence that there was a communication problem.

1.10 Aerodrome information.

The Weelde airfield – EBWE – is a military airfield operated by civilian clubs outside military activity hours.

The military airfield is equipped with a 2980m long x 45m wide concrete bi-directional runway, oriented 070°/ 250°.

For civilian use, the runway is reduced to 799m long and 18m wide.
Threshold 07: N051° 23' 42'' – E004° 57' 37''
Threshold 25: N051° 23' 51'' – E004° 58' 15''
The grass field right of runway 07 is used for the landings of sailplanes.

Elevation is 33m above sea level

The airfield is operated during daytime hours.
Flight Information Services are given by radio: 'Weelde Radio' - 119.600 MHz

The use of the AD is subject to prior permission from the operator.

The circuit height for gliders is 600ft (180m) AGL.

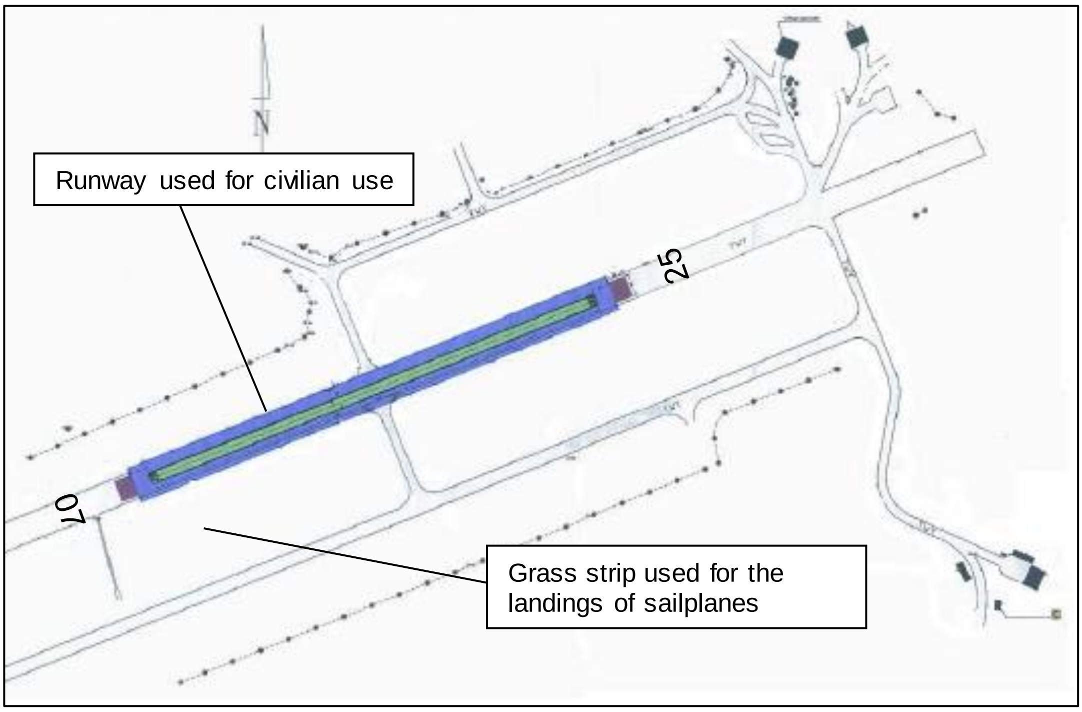

Figure 8: Layout of Weelde airfield

1.11 Flight recorders.

There is no requirement to have a flight recorder installed, however the aircraft is equipped with a Flarm. This is an EASA approved electronic system used to selectively alert pilots to potential collisions between aircraft. It obtains its position and altitude readings from an internal GPS and a barometric sensor. It also contains flight recording by IGC approved for gliding competions. In this case, geographical coordinates and pressure altitude were recorded every eight seconds.

The last part of the flight path was reconstructed using the recordings of the Flarm, see Figure 1.

1.12 Wreckage and impact information.

The front belly of the fuselage was cracked but not heavily deformed. Both the nose and main wheel were distorted upwards. The aft tail section was severed at approximately 80cm from the tail end. The L/H wing leading edge was damaged near the wing root.
The top skin of the fuselage was cut and removed by the rescue services to facilitate the evacuation of the pilot.

The parachute was found behind the aircraft with the chords still attached to the tail structure.

The flaps were found in the neutral position, the airbrakes were raised in a position between the retracted and intermediate position and the parachute activation handle was found in the locked position.

The box release mechanism, which will be described further, showed no signs of pre-existing damage (such as corrosion, deformations, etc.).

The surface didn't show either sliding marks or impact holes, which is consistent with a steep impact with relatively low energy. The separation of the aft tail section can be declared as the result of the secondary impact, also called the 'tail slap down', in which the aircraft rotates around its center of gravity due to the reaction forces on the nose.

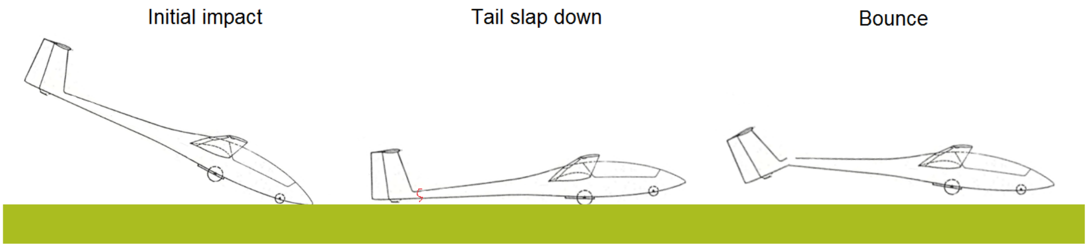

Figure 9 : Sketch of the impact sequence

1.13 Medical and pathological information.

See '1.15 Survival aspects'

1.14 Fire.

There was no fire.

1.15 Survival aspects.

The accident happened on the airfield with a lot of by-standers, so the rescue services where immediately warned and subsequently quickly arrived on site. Due to the absence of any hazard (like inflammable goods), the rescue workers had the time to evacuate the occupants in the best way possible. Because the pilot suffered vertrebral injuries, a cut was made in the fuselage structure aft of the canopy in order to evacuate the pilot in a straight line by use of a spinal board.

The Flarm recordings indicate that the final descent had a slope of about 20% (+- 11°), which can be considered as steep. Both crew reports and witness statements from bystanders declare that this happened with a nose-down attitude. The fact that the aircraft almost immediately came to a stop on the ground and the nose section was quite intact are consistent with an inital low kinetic energy impact. Whereas this initial impact was in the longitudinal direction, the spinal injuries of the pilot may be ascribed to the (peak) vertical deceleration during the subsequent tail slap down. There was no shock absorption provision in the seats to reduce the deceleration forces exerted on the crew.

Both occupants made use of the available restraint system, preventing further injuries.

1.16 Tests and research.

<u>Test flights after repair</u>
After the aircraft had been repaired, two experienced pilots from the ‘Liga van Vlaamse Zweefvliegclubs’ (LVZC) performed two test flights to check the aircraft and the brake chute system. According to them everything worked as it should. Their feedback was that the deployment of the parachute was noticeable but not that significant at the normal approach airspeed. The rate of descent can rise up quickly (up to 15m/s) without a distinct increase in airspeed. As a consequence, the flare has to be initiated earlier than in a parachute-less landing.

<u>Flight test evaluation for Soaring Magazine</u>
In 1979, *Soaring Magazine* published an article about a flight test executed with the Janus. Amongst others the performance of the tail brake chute was tested. The author describes literally that these tests ‘resulted in little praise’. The proper deployment at 55kts (101km/h) was not readily apparent to the pilot because the drag deceleration force was relatively small compared to the inertia of the loaded sailplane, although he felt a low opening force. As from 80kts (148km/h) the opening and drag forces were fairly obvious.

The low effectiveness at low speeds described in this article was confirmed by other experienced sailplane pilots as well as the fact that ‘some seconds’ of delay is possible between activating the handle and the release, depending on the packing of the parachute.

1.17 Organizational and management information.

The Vlaamse Zweefvlieg Academie (VZA), as part of the LVZC, has always organised initial and progressed training according to the procedures and guidelines of the LVZC by flight instructors recognised by the latter.

Since 31 March 2015, VZA is part of the LVZC Approved Training Organization (ATO) with reference number BE/ATO-323.

The type rating of the Janus C has been split up in 2 stages by the training department of the aero club; a basic rating and a full rating with parachute landings included.

A translated extract of the rating program;

Full parachute rating Janus C:

- Know how to use the parachute:
  - PIC activates parachute
  - Co-pilot jettisons (after command by the PIC)
- Always jettison the chute:
  - Normal landing and training landing: immediately after touching the ground while rolling
  - When needed: up to full stop
- Simulation off-field landing behind an obstacle
- 3 parachute landings with use of flaps and airbrakes
- Landing with prematurely jettisoning the parachute
- Parachute landing with crosswind

1.18 Additional information.

<u>Brake chute malfunctions</u>

Chapter 8 of the *FAA Glider Flying Handbook* (reference FAA-H-8083-13A) describes how to handle probable parachute malfunctions:

> There are several failure modes for drogue chutes….
>
> …During the approach to land, an improperly packed or damp drogue chute may fail to deploy on command. If this happens, use the rudder to sideslip for a moment, or fan the rudder several times to yaw the tail of the glider back and forth in rapid alternation. Make certain to have safe flying speed before attempting the slip or fanning the rudder. Either technique increases the drag on the tail cone that pulls the parachute out of the compartment.
>
> If neither technique deploys the drogue chute, the drogue canopy may deploy at a later time during the approach without further control input from the pilot. This will result in a considerable increase in drag. If this happens, be prepared to jettison the drogue chute immediately if sufficient altitude to glide to the intended landing spot has not been reached.

2 Analysis.

2.1 Retarded deployment

The reason why the parachute would not have immediately been deployed could not be determined. The pilot was used to folding up the parachute and declared that he always did it in accordance with the instructions. He confirmed the parachute wasn't wet or damp when he put it in the box before the accident flight. The releasing mechanism also didn't show any signs of pre-existing damage corrosion.

A possible scenario for the malfunction would be that the box did not completely move down upon the activation of the handle and just remained in position due to friction between the locking pin and the locking fitting inside the box.

2.2 Recovery action

A solution would be to shake the tail brake parachute assembly, by putting the sailplane into a gentle slip or fanning the rudder (fish-tailing) to increase the drag on the box in order to stimulate the release of the box and subsequently the deployment of the parachute. In any case, a sideslip should to be done very gently, especially close to the ground, as it is reported that it will cause a significant nose drop in full landing configuration.
If that doesn't help, the handle lock plate could be removed in order to be prepared for the jettisoning of the parachute. The latter is not easy to be performed by the pilot flying in the last seconds before touchdown (because of the necessary switching of hands), however with the correct briefing and coordination this task can be delegated to the pilot sitting in the aft seat.

2.3 Control

According to other pilots and the flight test evaluation in *Soaring Magazine* the effect of the brake parachute is low at the approach speed of 90km/h. When well prepared (such as having a little excess in airspeed) a retarded inflation should not render the sailplane uncontrollable.

2.4 Training and procedures

The Flight Manual briefly describes the operation of the brake chute. Information on how to act when the parachute doesn't immediately deploy upon activation is missing.

However, according to the club, all members flying the Janus C followed a special training program within the club before being qualified for flights using the brake chute. This was also the case with both pilots on this flight.

2.5 Planning and decision making

The PIC declared that two weeks before he already experienced a retarded deployment of the brake chute. However it seems that there was no thorough post-flight analysis on what went wrong and how to deal with it in a future situation. There was also no pre-flight briefing on this between the PIC and his passenger-pilot.

The circuit was initiated on a normal circuit height (200m AGL), however after the turn into final, the glider had already lost some considerable height. When training a landing with brake chute, it's a good practice to add some tens of meters to the circuit height because of the steep descent angle once the parachute has been activated. When too low, the pilot should decide not to use the brake chute.

At the moment that the passenger asked if the parachute was already out, the only feedback from the PIC was 'not yet'. There was no further communication between the two on how to proceed. The passenger momentarily thought to remove the lock plate at his activation handle, but was not prepared for doing it. Although the selfmade lock plates are non-approved parts, there is no indication that the absence of it would have prevented the accident.

3 Conclusions.

3.1 Findings.

- The aircraft had a valid Airworthiness Review Certificate and had been maintained in compliance with the regulations.
- There was no evidence of any defect in the brake chute system.
- The brake chute is not a required equipment to comply with the airworthiness requirements of the aircraft and is already removed in many other aircraft.
- The use of lock plates for the activiation handle is a non-approved modification.
- Both the pilot flying as well as the passenger-pilot held a valid licence, were properly qualified and were medically fit to perform the flight.
- It is not clear whether the deployment of the brake chute was retarded due to a mechanical lock, initiated too late in the approach or even a combination of both.

3.2 Causes.

A late deployment of a brake parachute at low altitude during landing, hindering the pilot in his execution of a proper flare, with a nose-down impact to the ground as a consequence.

<u>Contributing safety factors:</u>

- Airmanship: no lessons learned from previous event, no thorough preflight briefing between the crew
- Procedures: lack of guidelines on how to handle in case of a malfunction of the tail brake chute system

4 Safety actions and recommendations.

4.1 Safety issue: existing procedure too limited

Although in this case there was definitely a lack of preparation and poor airmanship, the investigation concluded that the use of the tail brake chute should be better supported. Therefore;

Recommendation BE-2016-0021:
It is recommended that, considering the fact the tail brake chute is not an airworthiness requirement, the Liga van Vlaamse Zweefvliegclubs (LVZC) assesses the need to proceed operations with tail brake chutes. If decided to do so, the LVZC should revise the existing procedure by including:
- the removal of the lock plates before each training flight with planned parachute landing
- guidelines on how to handle tail brake chute malfunctions
- a description of the roles of both pilots in normal as well as abnormal operations
- the obligation to do a pre-flight briefing on the parachute procedures between both pilots.

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